

Base from U.S. Geological Survey Midland A-6, 1982; B-6, 1954, Quadrangles, Alaska

SCALE 1:31,680  
0.5 0 0.5 1 1.5 2 MILES  
0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY, FOX HILLS SURVEY AREA, WESTERN ALASKA

PARTS of IDITAROD A-6 and B-6 QUADRANGLES

by  
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## ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DigHEM™ EM system measured in-phase and quadrature components at five frequencies. Two vertical coil-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 300, 7200, and 56,000 Hz. EM data were sampled at 0.11 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coastal- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

## ELECTROMAGNETIC ANOMALIES

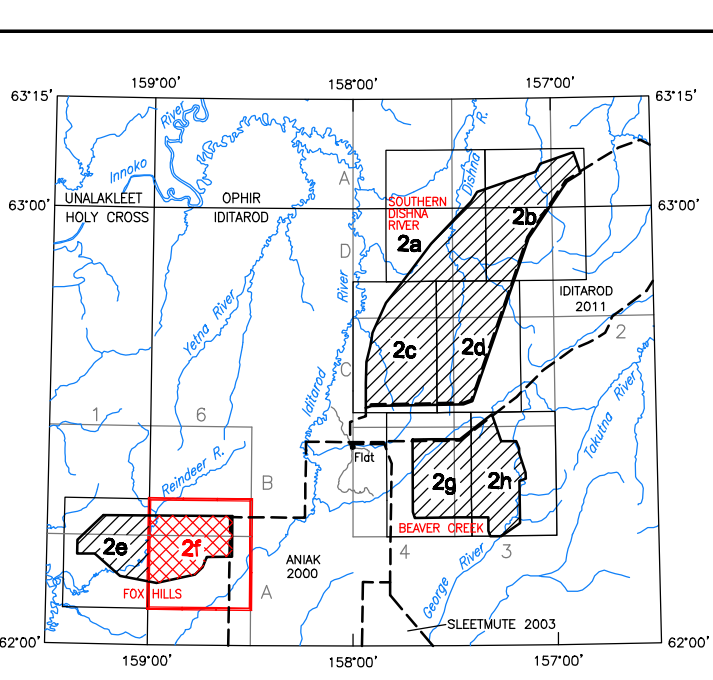
- |                     |   |
|---------------------|---|
| Interpretive symbol | Conductor model   |
| ●                   | Bedrock conductor   |
| ○                   | Narrow, bedrock conductor   |
| ○                   | Thin sheet  |
| ○                   | Conductive cover  |
| ○                   | Horizontal thin sheet   |
| ○                   | Broad conductive rock unit, deep conductive weathering, thick conductive cover  |
| ○                   | Half-space  |
| ○                   | Edge of broad conductor   |
| ○                   | Wedge of half space   |
| ○                   | Culture, e.g. green line, metal building or fence   |
| ○                   | Magnetic  |
| ○                   | Indicates some uncertainty as to true most appropriate EM source model, but does not question the validity of the EM anomaly. |
- |                      |
|----------------------|
| Conductance          |
| >100 siemens         |
| 50-100 siemens       |
| 20-50 siemens        |
| 10-20 siemens        |
| 5-10 siemens         |
| 1-5 siemens          |
| < 1 siemens          |
| Questionable anomaly |
| EM magnetic response |
| Culture              |
- |                     |  |
|---------------------|--|
| Interpretive symbol |  |
| ○                   | Arrows indicate the conductor has a thickness >10m |
| ○                   | Dip direction                                      |
| ○                   | Magnetic correlation in NT                         |
| ○                   | Anomaly identifier                                 |
| ○                   | Interpretive symbol                                |

## DESCRIPTIVE NOTES

The geophysical data were acquired with a DigHEM™ Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

## LOCATION INDEX OF 1:31,680-SCALE MAPS



## RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-602.

## SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGs), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 2013, and 2014. Previously flown DGGs surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGs, 3354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGs website ([www.dgg.alaska.gov/pubs](http://www.dgg.alaska.gov/pubs)). Maps are also available on paper through the DGGs office, and are viewable online at the website in Adobe Acrobat PDF file format.